Gender bias in media coverage of election campaigns

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Gender Bias in Media Coverage of Election Campaigns*

Fabrizio Gilardi† Bruno Wueest‡

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1 Introduction

There are many ways in which gender bias affects elections, including differential political ambition for men and women, biases in the recruiting strategies of parties, and voter behavior. We focus on the way in which the media report on male and female candidates. How female candidates are portrayed in the media is arguably of considerable importance both for their electoral prospects and for their decision to run for office in the first place. The literature has shown that media bias has decreased in the past decades, and scholars disagree about the nature and extent of remaining gender differences, and especially the degree to which women are portrayed according to gender stereotypes.

This study aims to gain a deeper understanding of gender bias in media coverage of elections by relying on an almost comprehensive dataset of news items covering the 2015 Swiss national elections, including over 200,000 documents from 70 sources, matched with information on all 3,927 candidates. Our analysis proceeds in three steps.

First, we focus on media attention. The unit of analysis in this part is the candidate and the dependent variable the number of times he or she was mentioned in newspaper articles during the campaign. We find a significant gender bias, except for incumbents.

Second, we use structural topic models to identify the topics of media coverage and, especially, how the prevalence of each topic correlates with the gender of the candidates mentioned in the texts. We find that the controversies and scandals are discussed disproportionately together with male candidates, while reporting on the electoral contest occurs disproportionately in connection with female candidates.

Third, always relying on structural topic models, we search for the usage of gender stereotypes in the media coverage of the election by assuming a large number of topics. Across 100 topics, eleven could be conceivably seen as linked to stereotypes; however, the connection with stereotypes is very loose. Moreover, only two of these eleven topics correlate with mentions of male or female politicians. Ultimately, only one topic can plausibly be understood in terms of gender stereotypes. This may mean that gender stereotypes were indeed largely absent from media coverage of the campaign, or that such stereotypes were used but are undetectable using our method.

2 Previous Studies

There is a relatively large literature on how female candidates are portrayed in the media, relative to men. Studies have focused on two main aspects: first, attention (e.g., the number of stories mentioning a candidate) and second, content (how a candidate is portrayed). When looking at content, studies typically differentiate among several categories, such as issues, horse race, and candidate traits. The consensus seems to be that biases in coverage have sharply decreased over time, but there is disagreement over the remaining extent of bias as well as its nature and causes. It is also unclear to what extent gender stereotypes continue to be used in the coverage of candidates, how subtle they are, and how they can be uncovered.

Early studies noted a significant bias in coverage against women (**??**). However, a decrease in bias was noted as early as the 1990s: "Analyzing statewide campaigns in 1994, I find much smaller coverage differences than in studies relying on pre-1990 data" (**?**, 71). Later studies find that the bias keep getting smaller, while uncovering more subtle ways in which coverage disadvantages women (**??????????**).

? is representative of the literature in several ways.[1] First, it relies on a small sample (354 articles) that were coded manually. Second, it finds little bias on several important dimensions: it "fails to find any significant gender differences in 1) the amount and prominence of candidate coverage, 2) the amount of attention given to the candidates' viability, 3) the focus on the candidates' family background, and 4) the tone of coverage" (**?**, 381). Third, it notes remaining imbalances in reporting, notably in terms of the gender stereotypes used by journalists.

? is one of the largest studies, including over 10,000 news stories. It focuses on the content of coverage in election with female candidates, compared with all-male races, and finds that the former tend to be more focused on traits rather than issues. **?** is another large study, relying on the 2009 European Election Study's Media Content Data, with candidate level data on media coverage from 25 European Union member states. It finds a small but persistent gender gap in the amount of coverage, robust to controlling for candidate viability. **?** focuses on the US, with data on 4,748 news stories in 342 districts, for a total of 108 female and 555 male candidates. It finds almost no gender gap in coverage, neither for frequency nor for the traits emphasized in the stories.

[1] Unlike most studies, it compares three countries (Australia, Canada, United States).

Like our study, **?** analyzes the gender gap in the coverage of the 2015 Swiss national elections (both newspapers and radio/TV). Like other studies, it relies on a small sample (580 texts) that are coded manually. The study finds that female candidates are underrepresented, relative to their presence on electoral lists. However, the study finds no differences in the ways female and male candidates are portrayed.

There are few studies focusing directly on the usage of gender stereotypes by the media in the context of election campaigns. In the context of six gubernatorial campaigns in 1998, **?** finds that articles focus on personal traits when covering female candidates, and on policy positions and record when reporting on male candidates. But most studies looking directly at stereotypes focus not on their presence and nature in media reporting, but instead on the extent to which voters hold such stereotypes (**???**) and their effects on voters' perceptions of candidates (**??**).

3 Methodology

3.1 Corpus

Our analysis of the newspaper coverage of female candidates is based on the Selects Media Analysis 2015 (**?**). Although we focus on 70 German-language newspapers (see appendix A1), we plan to extend our empirical analysis to the French-language newspapers. The original corpus of 205,607 newspaper articles covers the period from the 1st of August until election day (October 18, 2015). National election campaigns traditionally start with speeches at the festivities surrounding the Swiss national holiday (1st of August). Thanks to a direct access to the repositories of the Swiss Media Service (`https://smd.ch/SMDView/`), we could retrieve virtually all documents published during this election campaign. The corpus comprises a large variety of sources: tabloid magazines such as *Schweizer Familie*, nationally important newspapers such as the *Neue Zürcher Zeitung* (quality press) or the *Blick* (tabloid), regional and local newspapers such as the *Zofinger Tagblatt*, online news sources such as *20 Minuten online* to specialized news outlets such as the *Finanz und Wirtschaft* (business news). Therefore, we are confident to have a comprehensive enough data basis to map the general newspaper coverage of candidates in the German-speaking parts of Switzerland.

We use print media rather than television or radio programs partly for technical reasons but especially because they generally report more extensively on political matters than do on-air

media (**?**, 469). And despite strong convergence pressures, the newspaper market in Switzerland still is comparatively fragmented. Moreover, national elections in Switzerland essentially are cantonal elections, in which cantonal party sections have a decisive say in the selection of candidates and a commanding lead over elections campaigns in their constituency. Especially when it comes to cantonal political news such as the election campaign, we can therefore assume that newspapers convey the richest information.

To identify the relevant documents we relied on dictionary lookups and regular expressions. Concretely, we selected all documents featuring at least one name in a dictionary compiled from the official list of candidates in the federal election 2015 running for seats in the National Council or the Council of States. The final dictionary features 3,867 politicians. We only searched for the combination of first and last name[2], which greatly reduces the risk of false positives. Such a filter strategy is especially feasible since all entities of interest – i.e. the names of politicians – are readily available and, with only a few exceptions, precisely searcheable. From the originally 205,607 newspaper articles, about 10% contained at least one candidate. We therefore end up with a corpus of 20,104 texts.

3.2 Media Attention

The first step of the analysis focuses on media attention to female and male candidates. Here, we estimate negative binomial regressions at the individual level, that is, at the level of candidates. The unit of analysis is the candidate and we use the number of mentions for a given candidate as dependent variable. We estimate negative binomial models because these two variables are highly over-dispersed. Some people like the media stars Phillip Müller (then the party president of the FDP) or Roger Köppel (a famous journalist running for the first time for the SVP in Zurich) have a large number of of mentions, while many candidates have few or no mentions at all[3]. In addition to gender, we include the following variables: whether a candidate is an incumbent, a candidate's rank on party lists, a candidate's age the party of the candidate, and the canton in which a candidate is running.

[2]The regular expression used was $\backslash\backslash < [firstname].0,12[lastname]s?\backslash\backslash >$, which translates to a search for first and last name pairs that have a white space at the beginning and the end, at most twelve characters in between (e.g. a second first name) and an optional genitive s (e.g. "Kathy Riklins") at the end.

[3]951 of the 3,874 persons in the analysis are never mentioned, and another 553 are mentioned only once.

3.3 Structural Topic Model

We identify newspaper coverage themes inductively with a structural topic model (STM) (**??**), which builds on well-established generative topic models, namely the Correlated Topic Model (CTM) (**?**). Both the CTM and the STM are a mixed-membership models, meaning that they assume that each document consists of a mixture of topics (**?**, 283–285). A consequence of the logistic-normal distribution underlying these models is that topic prevalences always add up to 1 for each document. Therefore, if a topic has a higher-than-average prevalence in a document, it lowers the prevalence of the other topics. Concretely, the STM is a hierarchical model in which a document d's prevalence of each topic is drawn from a logistic-normal linear distribution whose mean is a function of document covariates. Therefore, the STM's major innovation is that the prior distribution of topics (prevalence) and words (contents) can be influenced by covariates (**??**). In the following analysis, we correlate the candidates' gender with both the topic's prevalence and the word's content, but report results only for the former.

Since we want to discover the semantic patterns that are related to the candidate mentions in the newspaper articles, we only include a text window of plus-minus two sentences around the sentence that contains an occurrence of a candidate into the analysis. Newspaper articles often cover much more than the description of candidates, so, after having tested models for entire articles and for different text windows, we found this text window of five sentences to work well for our purposes. Further, we preprocess these text contexts by removing numbers and punctuations, and by stemming all words.

The most important covariate in our analysis measures the gender of the candidates mentioned in a given text. Concretely, we measure whether a text mentions only female candidates, only male candidates, or both male and female candidates.

The analysis includes several other covariates, namely: (1) a daily trend variable with a B-spline of order 10; (2) newspaper IDs; (3) the log of the number of politicians mentioned in the text passage; whether at least one (4) incumbent is mentioned; (6) the party affiliation, age, age squared and list place of the candidates mentioned; (7) whether a candidate is running for the National Council or the Council of State; and (8) the SMA classification whether an article covers Swiss politics.

We estimate the topic models using the `stm` package in R (**?**). We initialize the models with

the spectral algorithm, which is robust to changes in several CTM parameters and starting values (**?**). To select the number of topics, we evaluated the semantic coherence of the topics using `word2vec` (**?**).[4] We evaluated nearly 97 models (varying the number of topics from 3 to 100[5]) and found that models with relatively few topics (6 to 9) performed better (see the analysis in Appendix A2). After a qualitative evaluation of the most probable words and documents of the models' topics in this range, we selected the 6-topic model as the most useful for our analysis at this stage. In addition, since we suspect that gender stereotypes in the media coverage only appear in a fine-grained semantic space, we estimate also a 100-topics model (full results in Appendix A3).

4 Results

4.1 Media attention

Table 1 analyzes the number of times candidates are mentioned in our corpus, distinguishing between candidates to the Council of States and the National Council. Similar to the US Senate, the Council of States represents the cantons equally regardless of their size. The National Council, on the other hand, is analogous to the US House of Representatives. An interesting variation between the two chambers, not found in the US, regards the electoral system. Almost all cantons elect the Council of States with a majoritarian and the National Council with a proportional system.

Table 1 shows that, controlling for incumbency status, male candidates receive more media attention than female candidates. Comparing coefficient sizes, the difference between men and women is about 26% of that between incumbents and non-incumbents in the Council of States election, and about 19% in the National Council election (models 1 and 3). Table 1 further explores interactions between candidates' gender and incumbency as well as, for the National Council election, whether a candidate is on one of the top-3 ranks in the party list ("Top candidate"). The results of these interactions are best seen in Figure 1. In both elections, there is a gender gap in media attention for non-incumbent candidates, but not for incumbents.

[4] In contrast to **?**, we consider not only coherence (the similarity of all word pairs in the same topic) but also discrimination (the inverse similarity of all word pairs across topics) in our evaluation.

[5] Due to the long running time of models with large number of topics, we could run most but not all of them for this evaluation.

	Council of States		National Council		
	(1)	(2)	(3)	(4)	(5)
(Intercept)	5.13**	5.70***	−2.93***	−2.91***	−2.92***
	(2.18)	(2.20)	(0.22)	(0.22)	(0.22)
Woman	−0.47*	−0.85**	−0.42***	−0.44***	−0.50***
	(0.26)	(0.38)	(0.05)	(0.05)	(0.06)
Incumbent	1.80***	1.72***	2.18***	2.07***	2.17***
	(0.18)	(0.19)	(0.11)	(0.13)	(0.11)
Top candidate			0.63***	0.63***	0.55***
			(0.06)	(0.06)	(0.07)
Woman × Incumbent		0.70		0.28	
		(0.51)		(0.22)	
Woman × Top candidate					0.22**
					(0.10)
Age	−0.05	−0.07	0.19***	0.19***	0.19***
	(0.08)	(0.09)	(0.01)	(0.01)	(0.01)
Age^2	0.00	0.00	−0.00***	−0.00***	−0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Canton FE	Yes	Yes	Yes	Yes	Yes
Party FE	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-385.43	-384.65	-10744.19	-10743.31	-10741.87
Num. obs.	73	73	3779	3779	3779

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 1: *Negative binomial regression coefficients. Dependent variable: number of times a candidate was mentioned in a news item.*

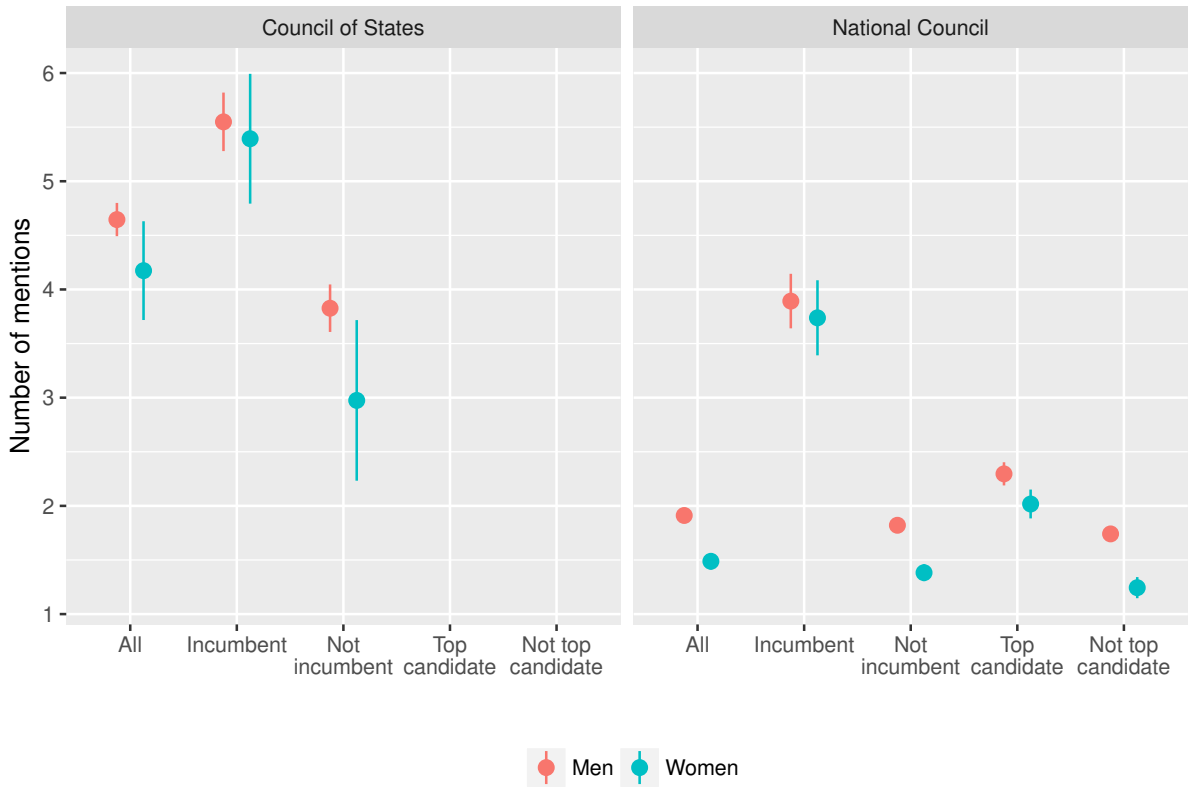


Figure 1: *Media attention to female and male candidates: Fitted values and 95% confidence intervals from full and the two interaction models shown in Table 1.*

Furthermore, in the National Council election, being a top candidate closes the gender gap in media attention, but only partially. That is, men on top of the party list are mentioned more frequently in the media than women on the same position, controlling for incumbency status.

4.2 General topics

Figure 2 shows the top words associated with each of our six topics, along with labels that we assigned to each topic based on those words. The interpretation of the topics is mostly straightforward, which is not self-evident considering that the topics were produced purely inductively, without human input apart from the selection of the corpus, covariates, and number of topics. *Campaign events* covers various types of events in connection with the electoral campaign. *Controversies* groups several themes that were discussed intensely during the campaign. The theme is dominated by a scandal in which a member of parliament wrote draft legislation drawing heavily on documents prepared by lobbyists working for Kazakhstan. *Electoral contest* is clearly about the outcome of the election: who gets elected, which party gains or loses seats. *Immigration and foreign relations* is dominated by the issue refugees, which was indeed one of the central themes of the campaign, but picks up also other issues related to immigration and international relations. *Media campaign* identifies discussions of the role of the media, and social media in particular, in the campaign. Finally, *Political profiles* refers to presentations of the candidates' profiles and programs. We conclude here that these topics offer a succinct and plausible depiction of the main themes of the campaign. None of the topics can be linked with gender stereotypes. This is not surprising, given that the small number of topics picks up only the broadest themes of the media coverage of the campaign.

Figure 3 shows the distribution of these topics over time. *Electoral contest* is, on average, the most frequent topic, with a spike near the very end of the campaign. The trends of the other topics are less marked but correspond to what we know about the campaign. For instance, many events took place on the first of August, Swiss national holiday and traditional start of the election campaign. The topic *Campaign events* peaks at the beginning of August.

The next step is to look at how these topics correlate with the gender of the candidates mentioned in the articles. Figure 4 shows that the largest gap is for the topic *Electoral contest*, which occurs disproportionately in articles mentioning female candidates. The opposite holds for

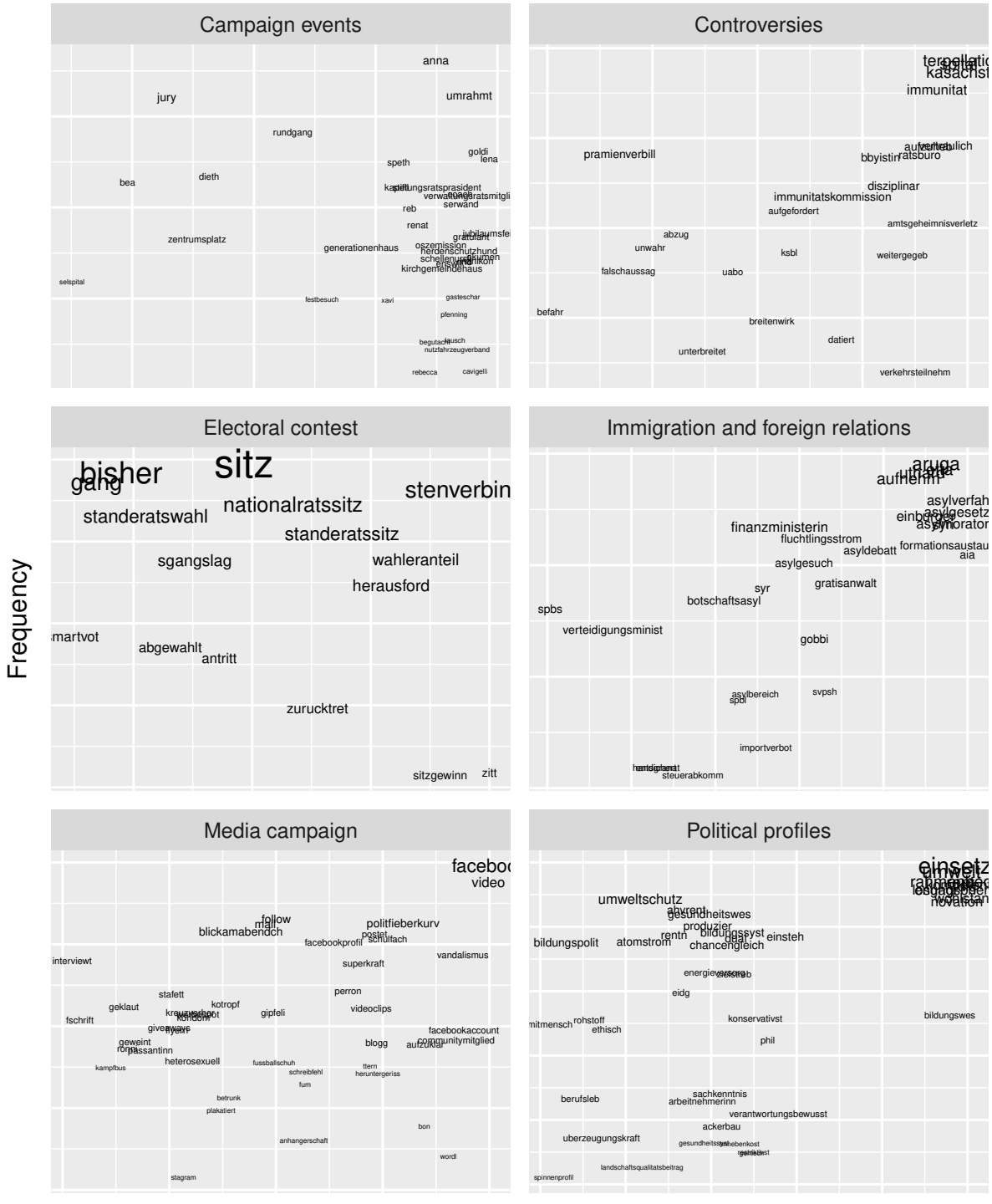


Figure 2: *Top words for the six-topic model.*

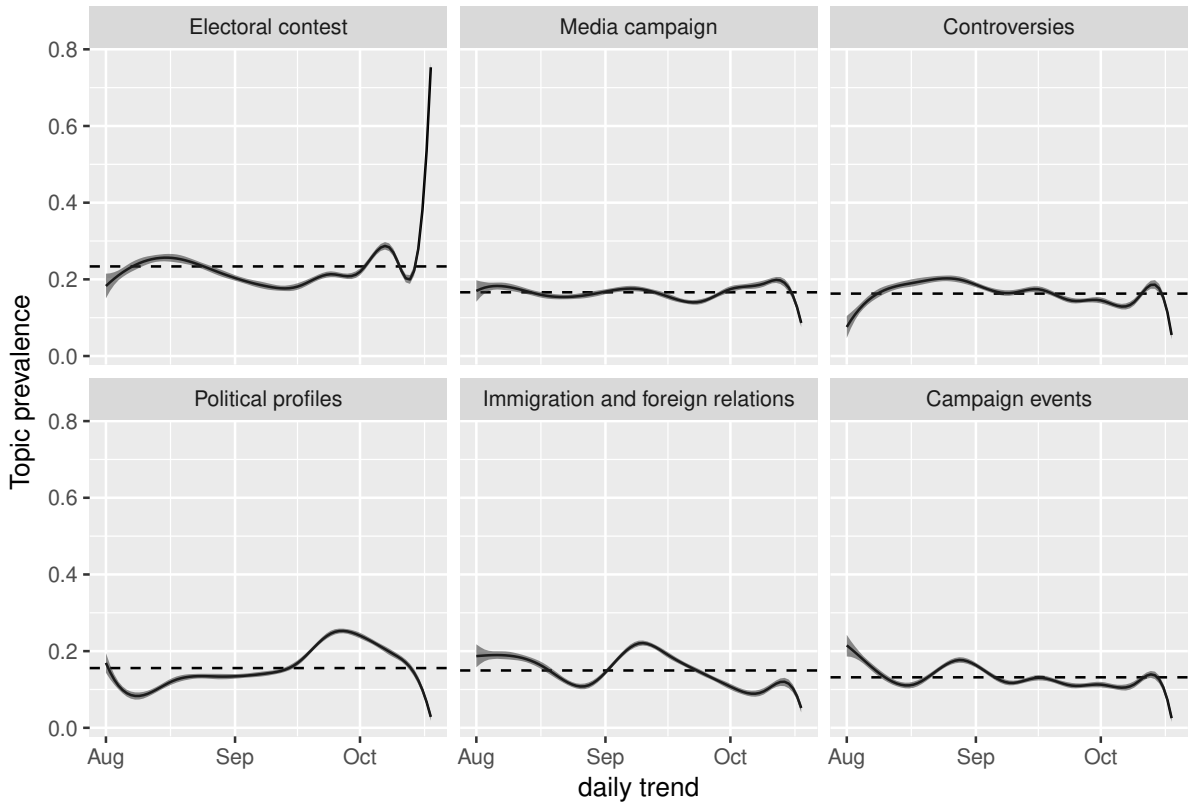


Figure 3: *Topic prevalence over time. Topics are sorted by decreasing average prevalence. Horizontal lines show average prevalence for each topic over the observation period.*

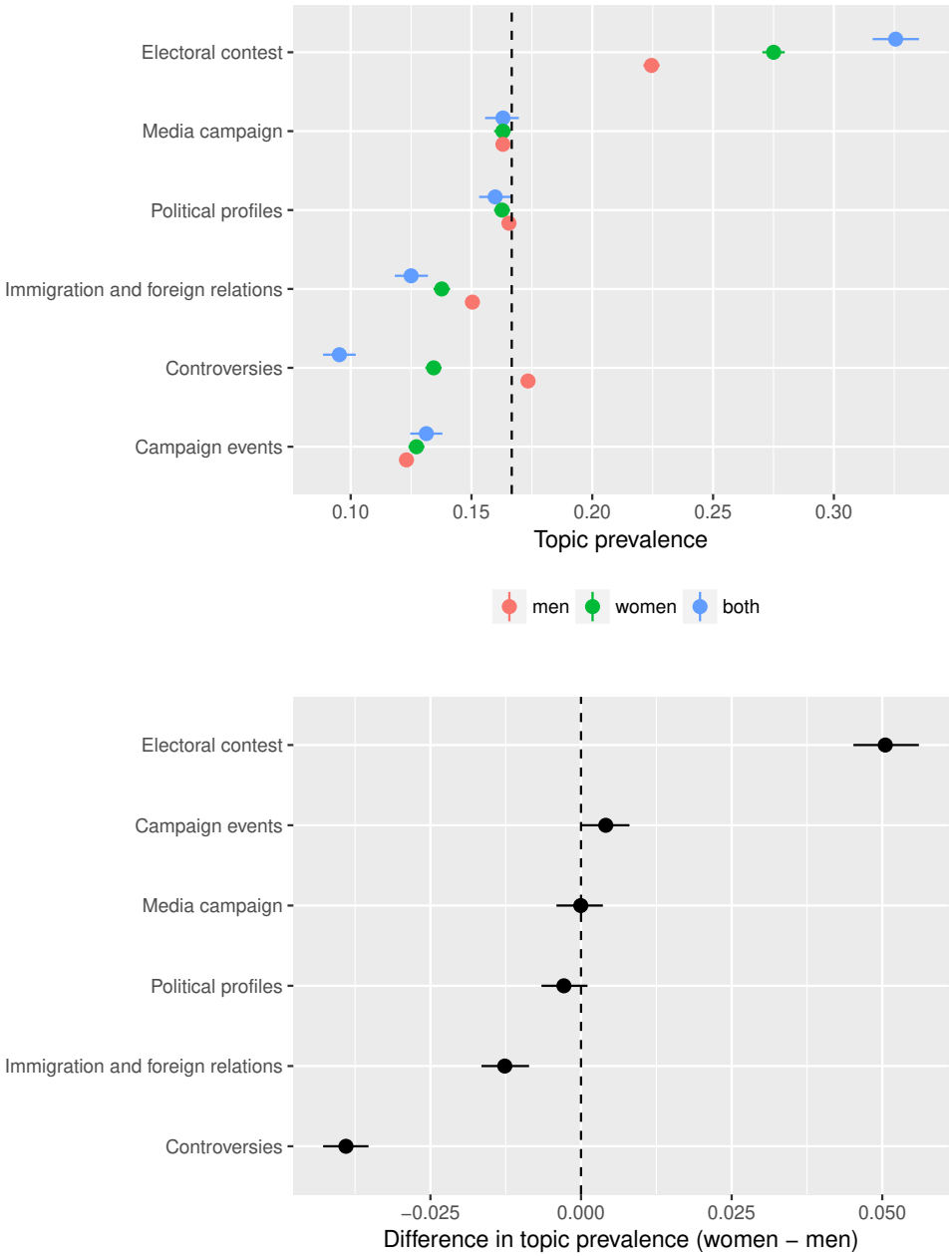


Figure 4: *Correlation between topic prevalence and the gender of candidates mentioned in the articles.*

Controversies, despite the fact that the politician at the center of the Kazakhstan affair was a woman.

4.3 Gender stereotypes?

Section 4.2 has shown that, unsurprisingly, gender stereotypes were not one of the main themes of the election campaign coverage. However, they might become visible if we increase the number of topics. Figure 5 shows the output of a 100-topics model; a less compact, more legible layout is in Appendix A3. Only eleven of the 100 topics might have some connection with gender stereotypes, but even in these eleven topics, the link with stereotypes is weak. We could not find topics that clearly pick up candidates' appearance or family situation, for instance. Instead, words potentially suggesting the usage of gender stereotypes in the texts are scattered across the eleven topics and do not come together in a coherent topic.

To further explore this aspect, Figure 6 shows the correlation between the 100 topics and the gender of the candidates mentioned in the texts. We notice that of the eleven topics potentially linked to gender stereotypes, only two exhibit a significant and sizable correlation with the gender of the candidates mentioned on the texts. The first is topic 9, which correlates with mentions of female politicians. This topics, as is clearly visible in Appendix A3, has to do with gender equality and quotas. While it makes sense that it appears more frequently in connection with female than male candidates, it is not as such an indication of gender stereotypes. The second topic, correlating with mentions of male politicians, is topic 61. Here, we find keywords such as "funny," "collegial," "intelligent," and "political star," which suggest these desirable traits might be more frequently associated with male than female candidates.

5 Conclusion

In this paper we have analyzed a unique corpus covering almost all articles written during the 2015 Swiss national elections, which we matched with information on all 3,927 candidates. Our analysis has identified three patterns regarding gender bias in media coverage of candidates.

First, media attention is biased against female candidates, except when they are incumbent. Controlling for their viability (their rank on party lists), non-incumbent men are mentioned more frequently than non-incumbent women. Holding one of the top-three positions on the party list

Figure 5: *100 topics. Topics that might have some connection with gender stereotypes (11/100) are in red.*

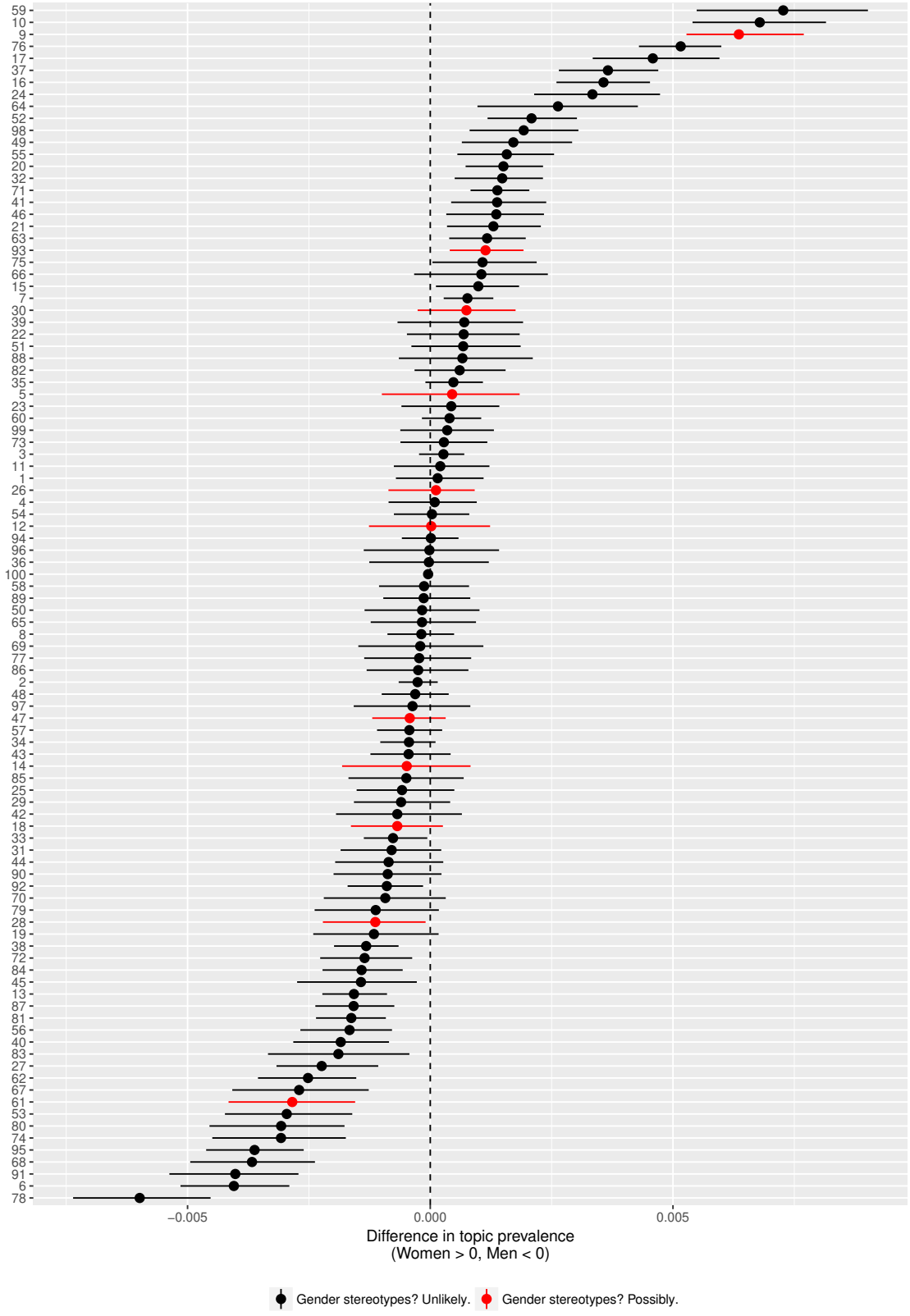


Figure 6: *Topic prevalence and gender (difference in probabilities).*

reduces the gender gap in media attention, but it does not eliminate it. We conclude that it is harder for female than for male newcomers to gain the attention that might help get them elected.

Second, none of the main themes that characterized the coverage of the campaign (*Campaign events*, *Controversies*, *Electoral contest*, *Immigration and foreign relations*, *Media campaign*, *Political profiles*) has a clear gendered dimension. However, *Electoral contest* was discussed disproportionately in connection with female candidates, while *Controversies* were discussed disproportionately in connection with male candidates.

Third, the usage of gender stereotypes in the election coverage was essentially undetectable using our methods. Of 100 topics our most detail model identified, eleven were potentially connected with gender stereotypes, using a very broad understanding of such stereotypes. Of these eleven topics, only two were discussed disproportionately with either male or female candidates, and only one is potentially linked with gender stereotypes. Specifically, in one of the 100 topics, attributes such as "funny," "collegial," "intelligent," and "political star" were used more frequently in texts mentioning man than in texts mentioning women.

A crucial question for the future direction of this project is to what extent structural topics are suitable for the identification of gender stereotypes in media coverage of candidates.

References

A1 Newspaper corpus

Name	N corpus	N filtered	Type	Name	N corpus	N filtered	Type
20 minuten	6'278	342	freesheet	Neue Luzerner Zeitung	8'933	1'048	national
20 minuten online	5'018	380	news portal	Neue Zürcher Zeitung	8'528	648	national
Aargauer Zeitung	6'922	925	regional	NZZ am Sonntag	1'726	165	sunday
Anzeiger von Uster	288	27	local	Obersee Nachrichten	691	38	local
Basellandschaftliche Zeitung	1'772	306	regional	Oltner Tagblatt	1'173	113	local
Basler Zeitung	8'000	915	national	Ostschweiz am Sonntag	1'045	98	sunday
Basler Zeitung Newsnet	900	127	news portal	Rümlanger	147	16	local
Berner Zeitung	8'758	1'013	national	Schweiz am Sonntag	2'535	373	sunday
Berner Zeitung Newsnet	3'970	494	news portal	Schweizer Bauer	1'713	181	company
Bieler Tagblatt	2'738	165	local	Schweizer Familie	557	11	tabloid
Bilanz online	155	12	business	Schweizer Illustrierte	582	78	tabloid
Blick	4'137	274	boulevard	Seetaler Bote	777	71	local
Blick am Abend	3'102	257	boulevard	Solothurner Zeitung	2'486	356	regional
Bote der Urschweiz	4'793	436	local	Sonntagsblick	1'249	122	sunday
Bündner Tagblatt	4'232	540	regional	Sonntagszeitung	1'232	150	sunday
Cash	10'627	467	business	SRF	7'267	738	news portal
Coopzeitung	569	7	company	St. Galler Tagblatt	15'410	1'302	national
Das Magazin	123	5	weekly	Südostschweiz	5'504	599	national
Der Bund	5'520	664	regional	Swissinfo	153	40	news portal
Der Bund Newsnet	1'527	270	news portal	Tagblatt der Stadt Zürich	324	14	local
Der Landbote	5'010	532	regional	Tages-Anzeiger	6'566	692	national
Die Weltwoche	593	163	weekly	Tages-Anzeiger Newsnet	7'383	760	news portal
Die Wochenzeitung	399	92	weekly	Tageswoche	242	42	regional
Finanz und Wirtschaft (FuW)	1'158	18	business	Tageswoche online	734	105	news portal
FuW online	1'875	21	business	Thurgauer Zeitung	5'088	522	regional
Freiburger Nachrichten	2'818	208	regional	Volketswiler	161	14	local
Furttaler	413	26	local	Walliser Bote	3'899	574	regional
Glattaler	562	70	local	Werdenberg. & Obertoggenb.	5'357	403	local
Glückspost	816	3	tabloid	Willisauer Bote	1'485	142	local
Handelszeitung	773	69	business	Zentral plus	422	104	news portal
Handelszeitung online	503	23	business	Zentralschweiz am Sonntag	978	115	sunday
Infosperber	180	25	news portal	Zofinger Tagblatt	2'272	169	local
Limmattaler Zeitung	1'277	163	local	Zürcher Oberländer	3'934	397	regional
Medienwoche	39	5	news portal	Zürcher Unterländer	3'231	365	regional
Migros-Magazin	897	20	company	Zürichsee-Zeitung	5'081	475	local
				Total	205'607	20'104	

A2 Topic model coherence and discrimination

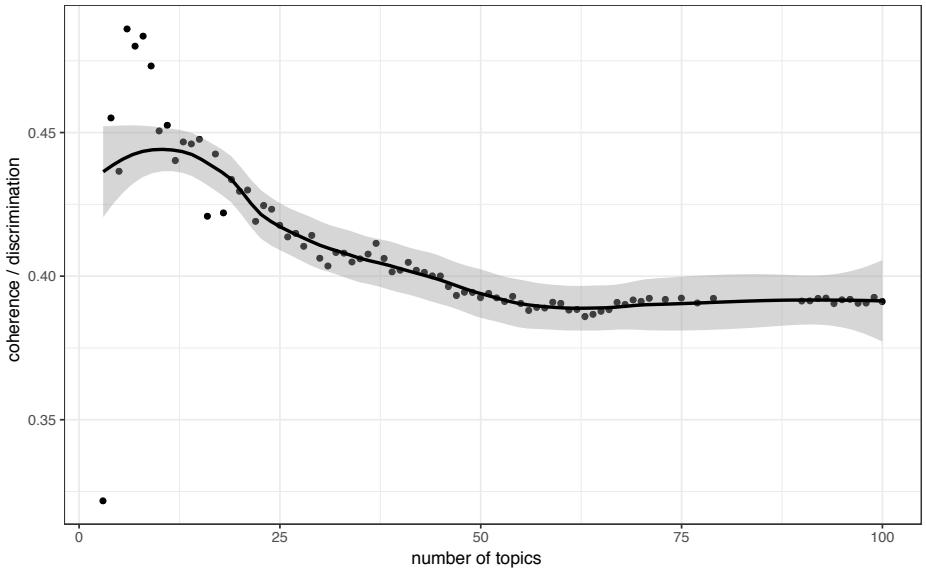
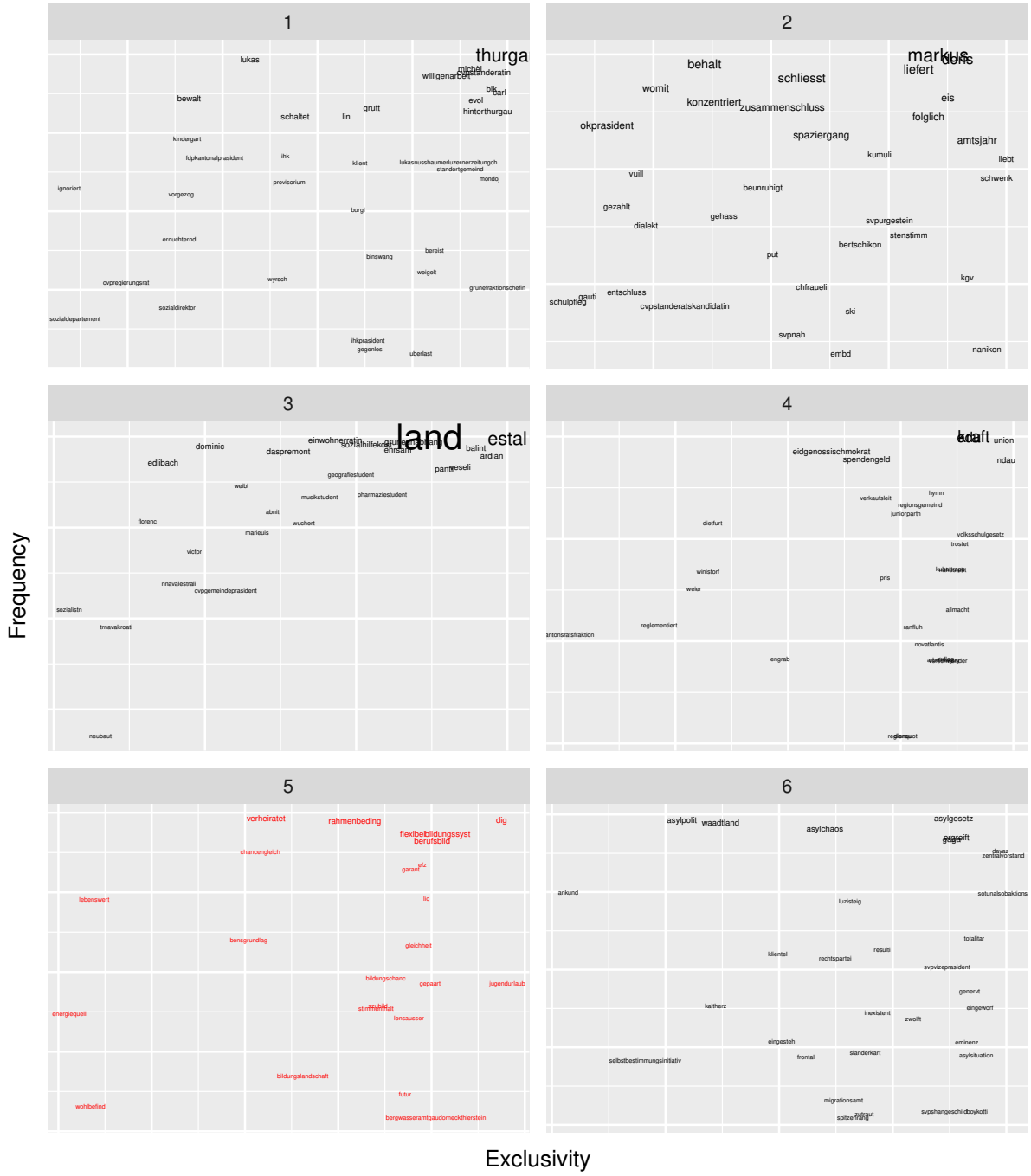


Table A1: *Word2vec topic coherence and discrimination averages for varying numbers of topics.*

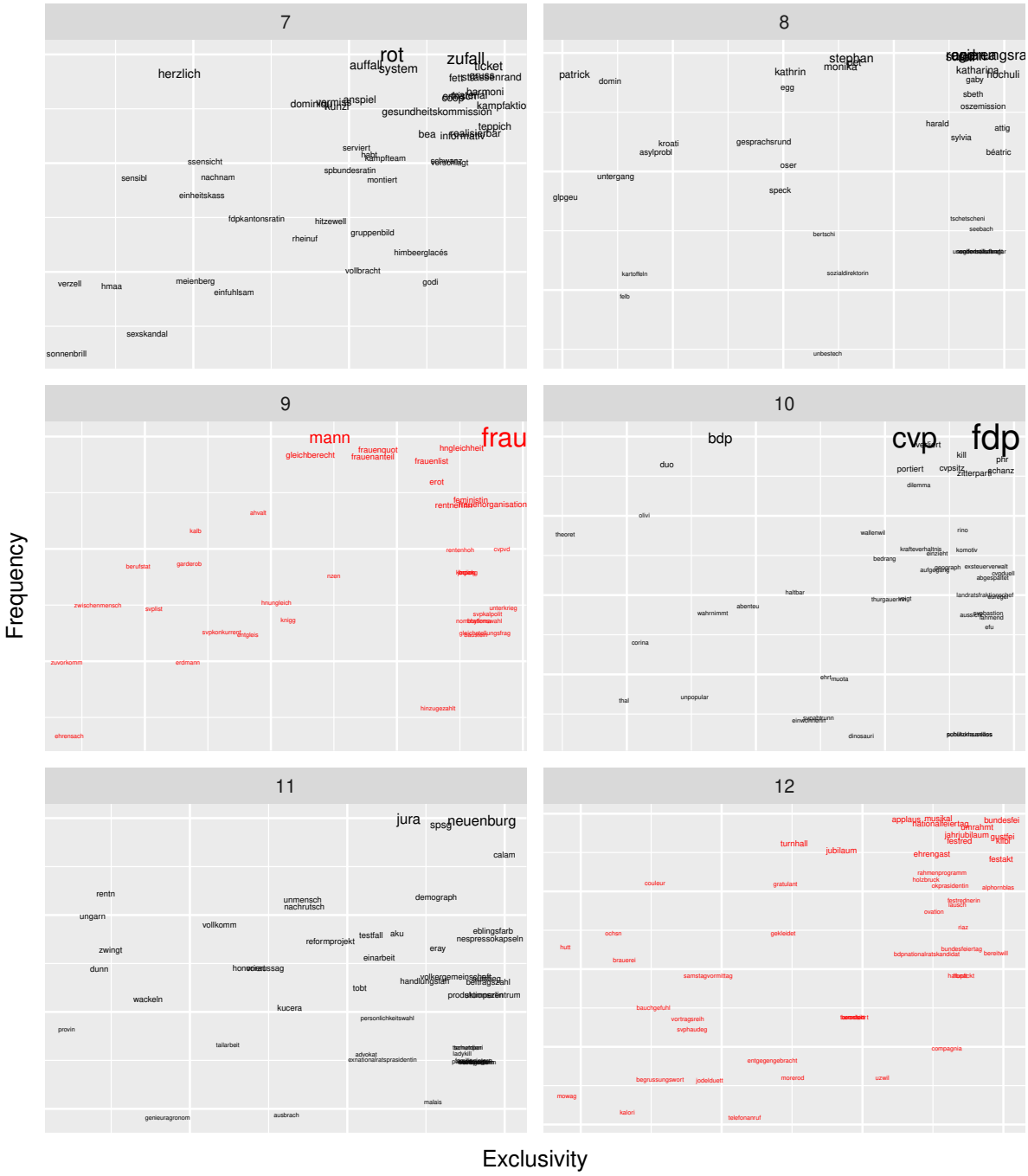
A3 100 topic model



Frequency

Exclusivity

Figure A1: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*



Frequency

Exclusivity

Figure A2: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

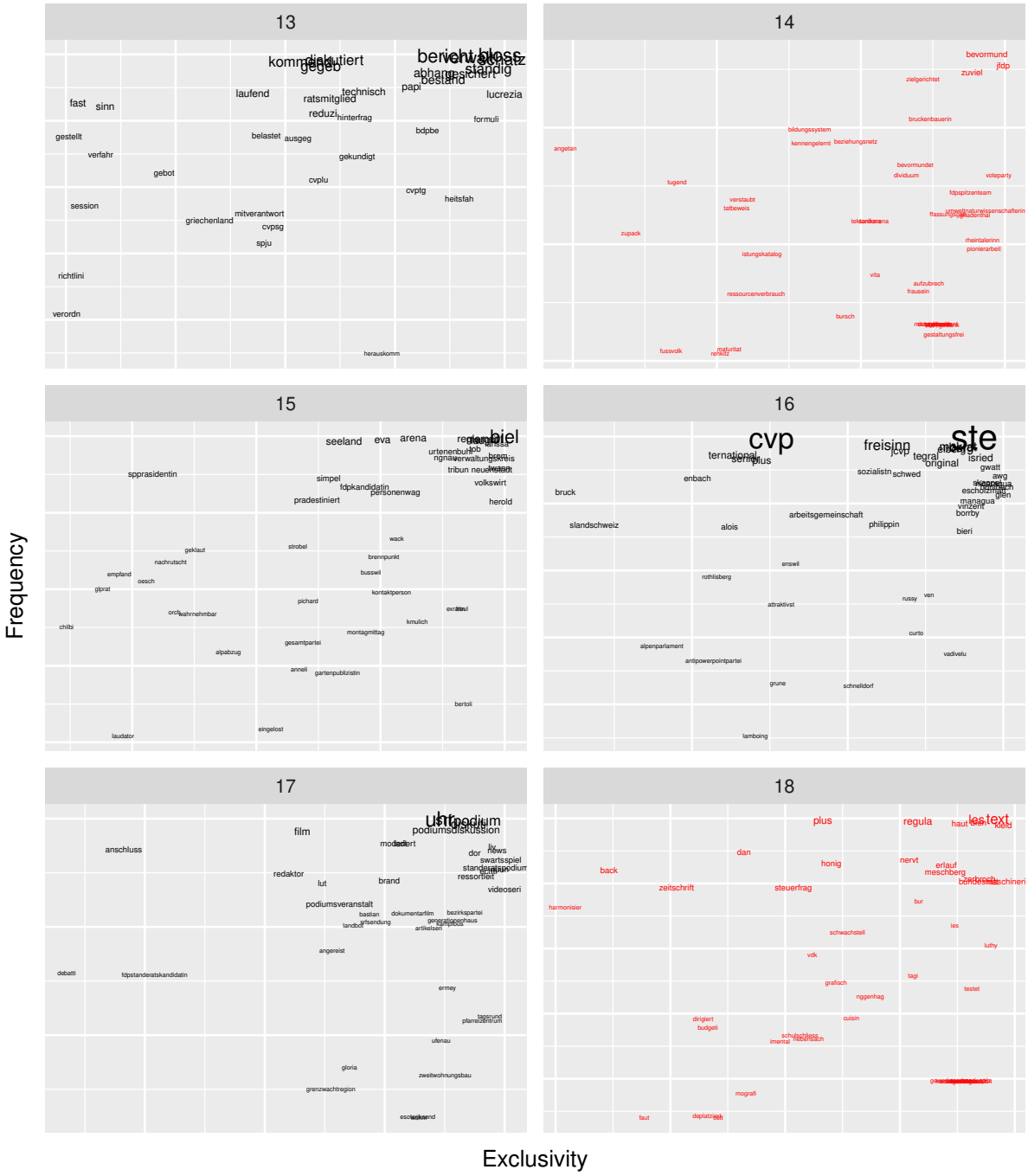


Figure A3: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

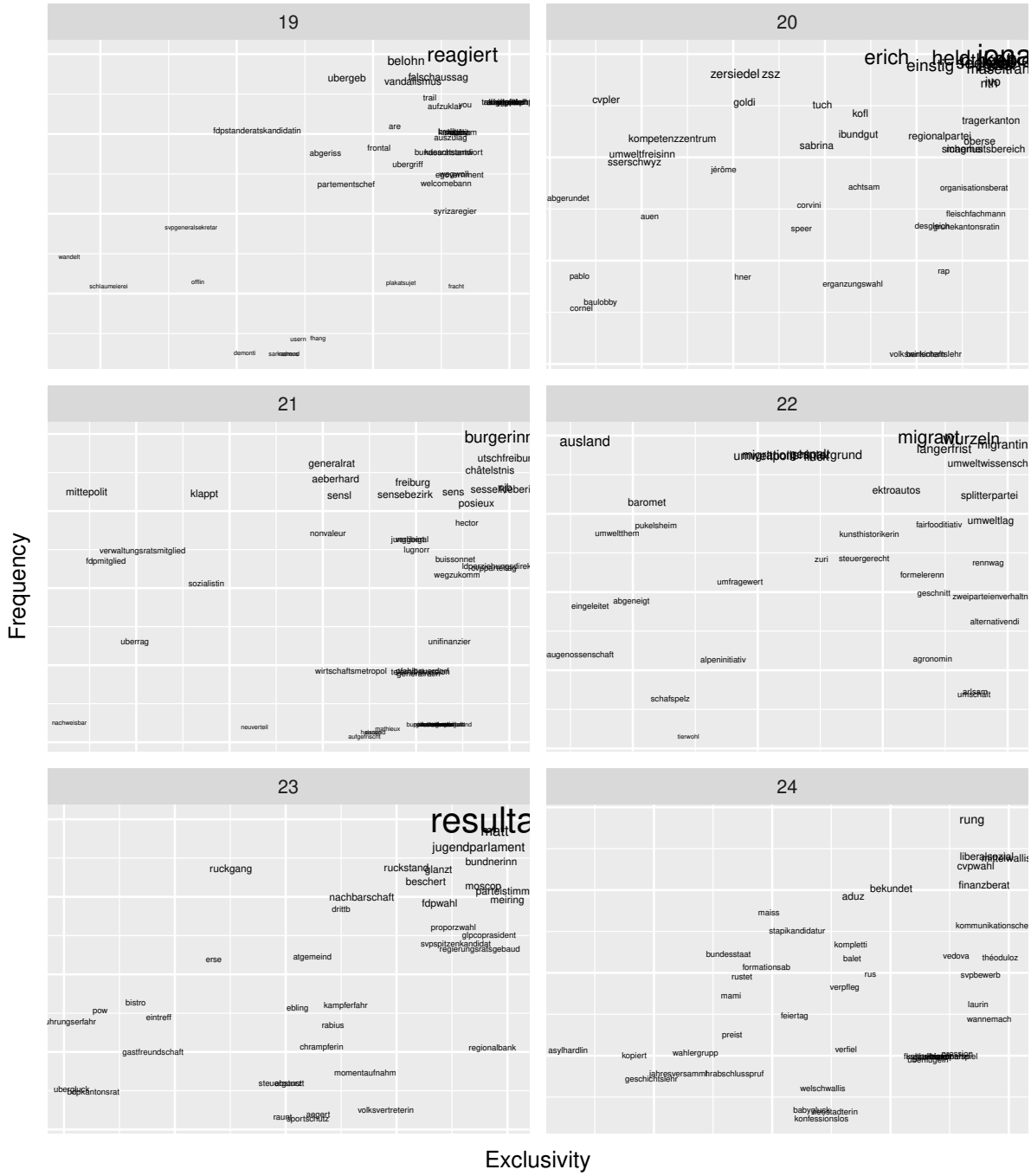


Figure A4: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

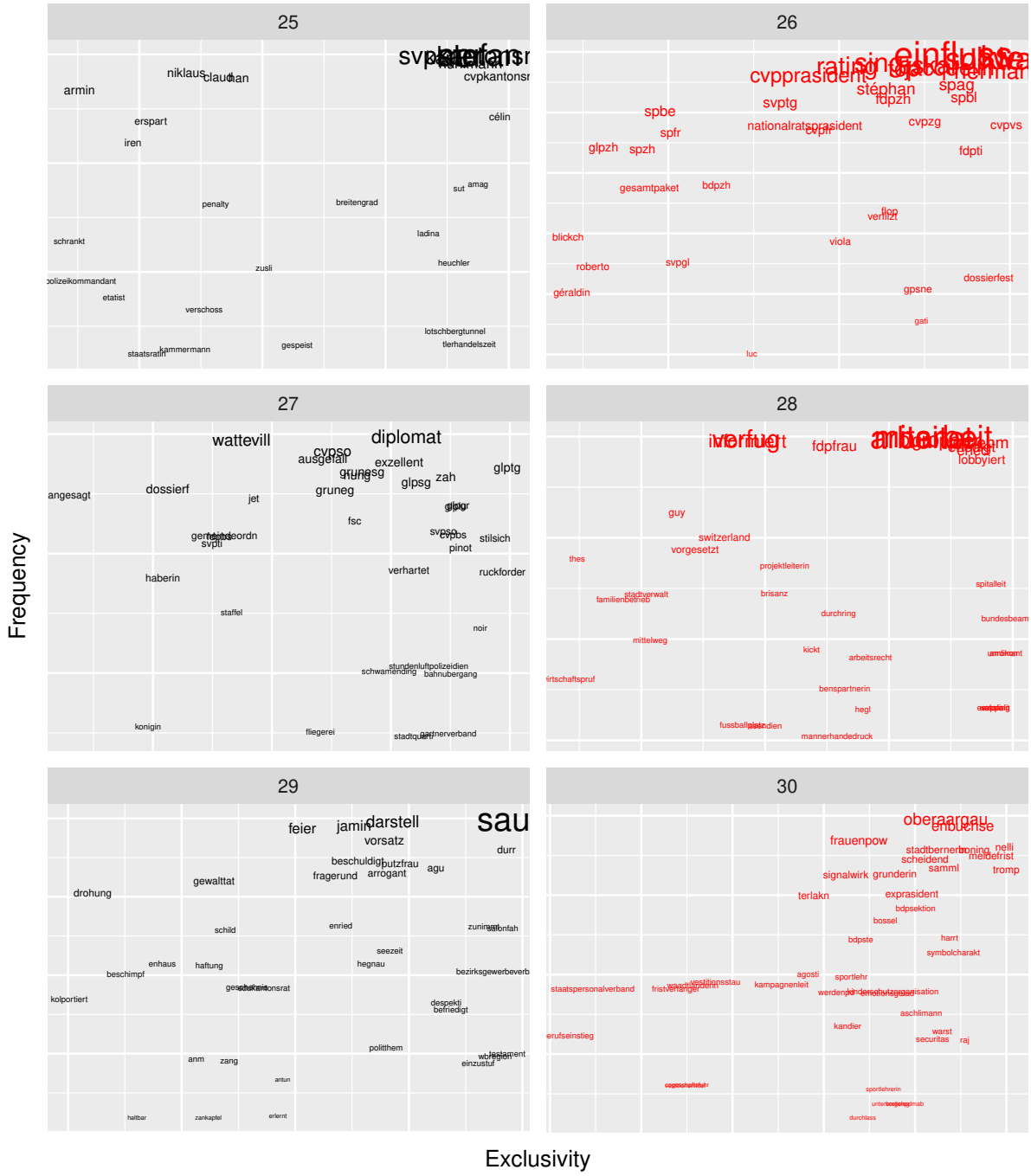


Figure A5: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

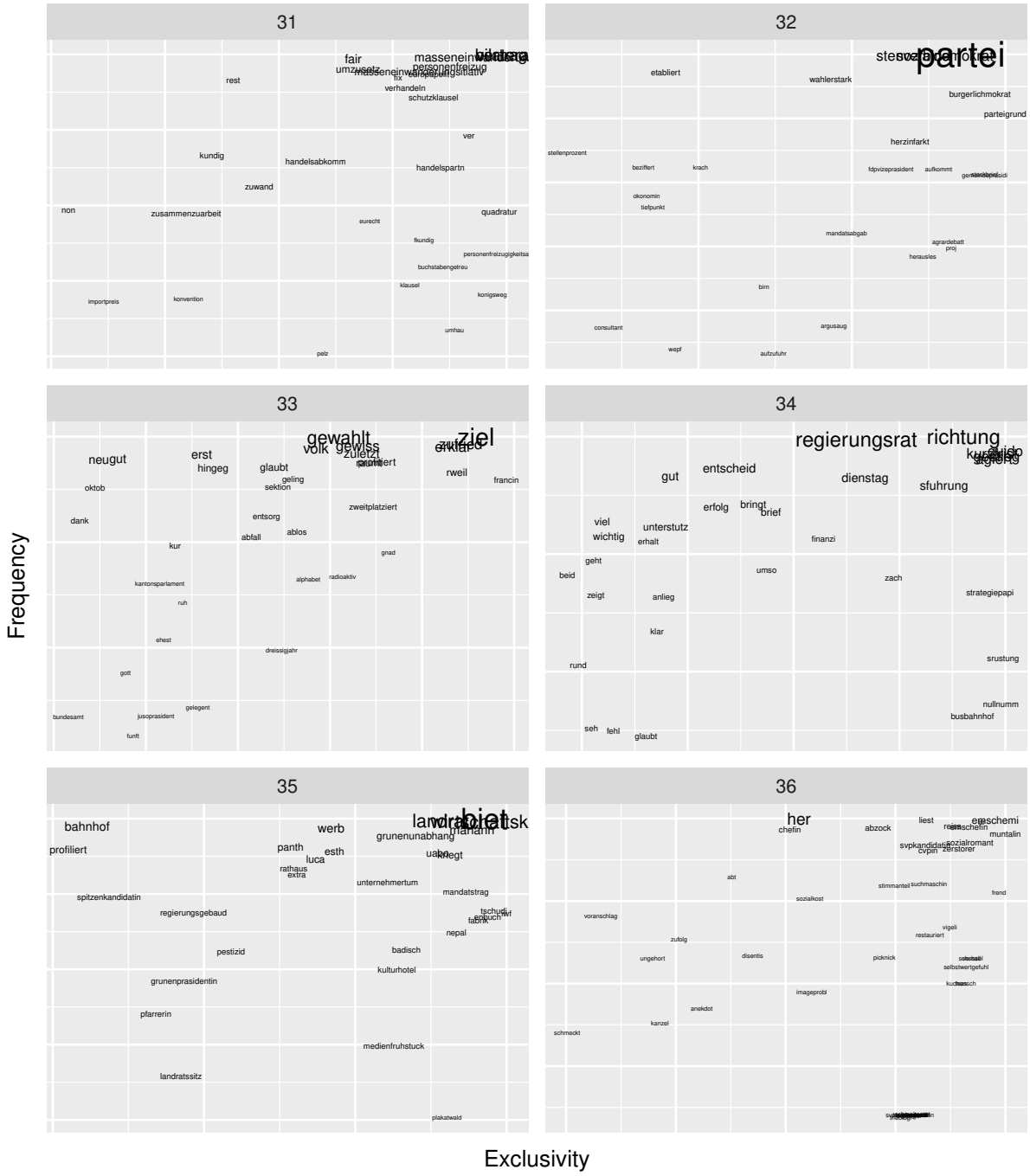


Figure A6: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

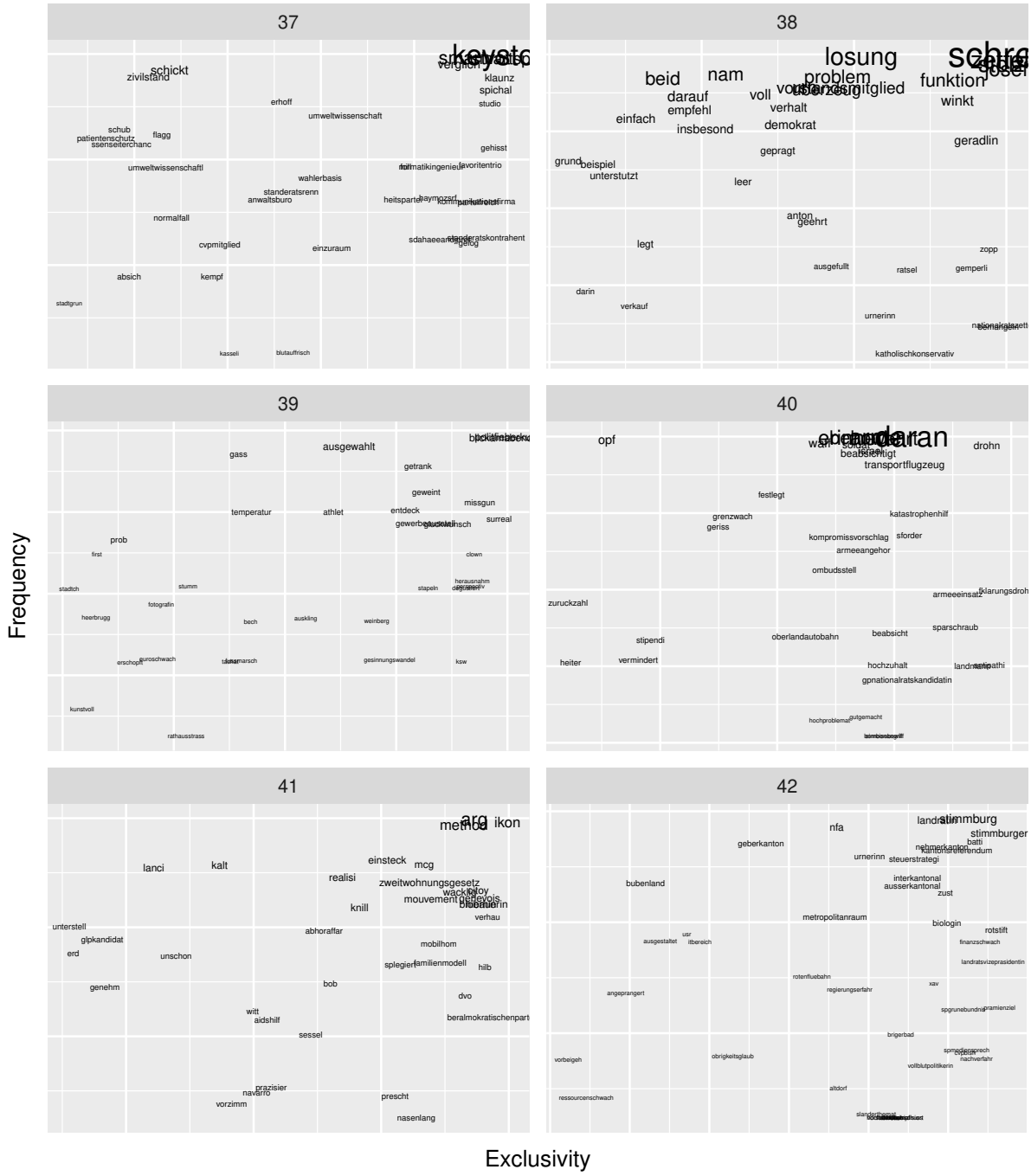


Figure A7: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

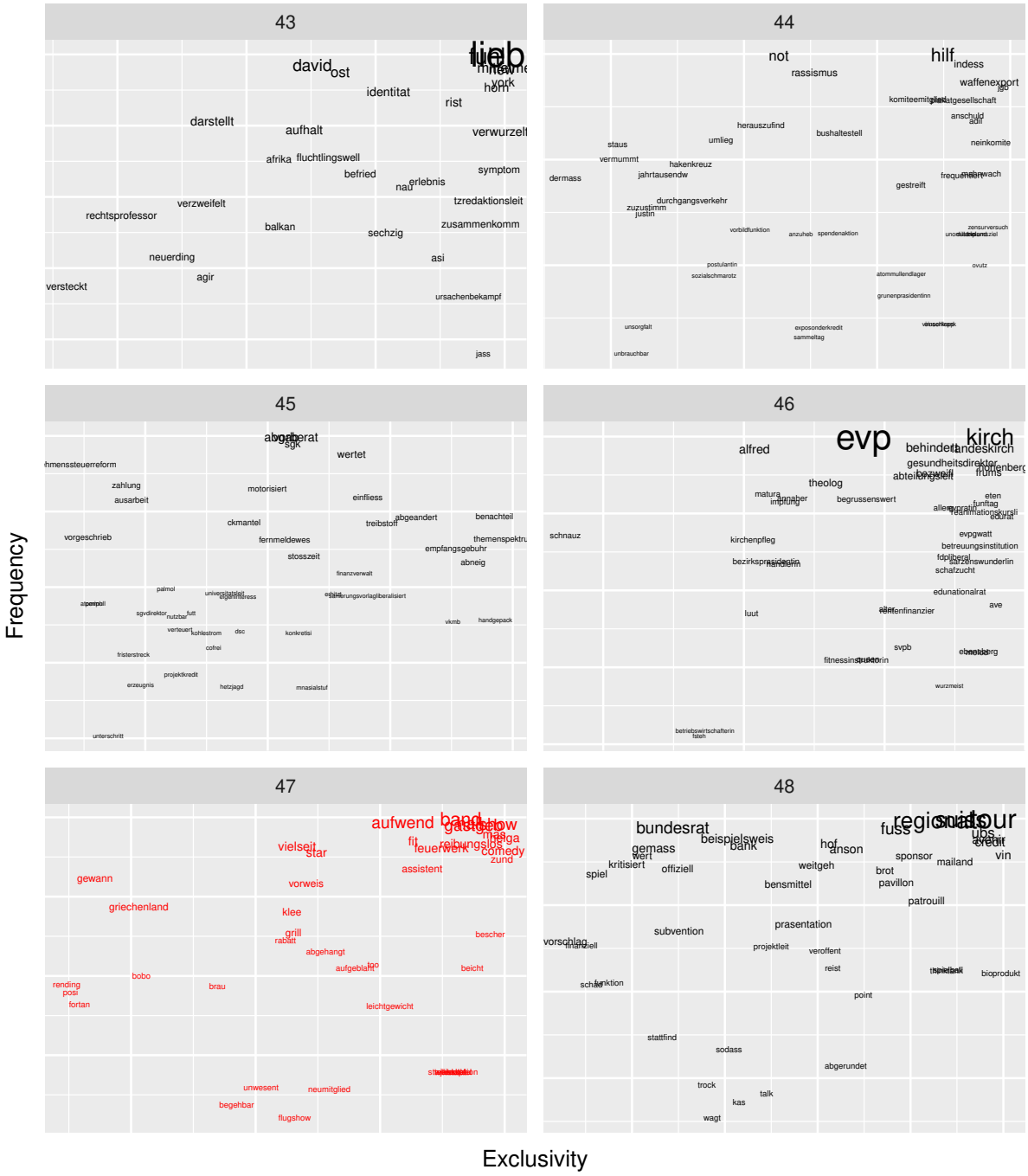
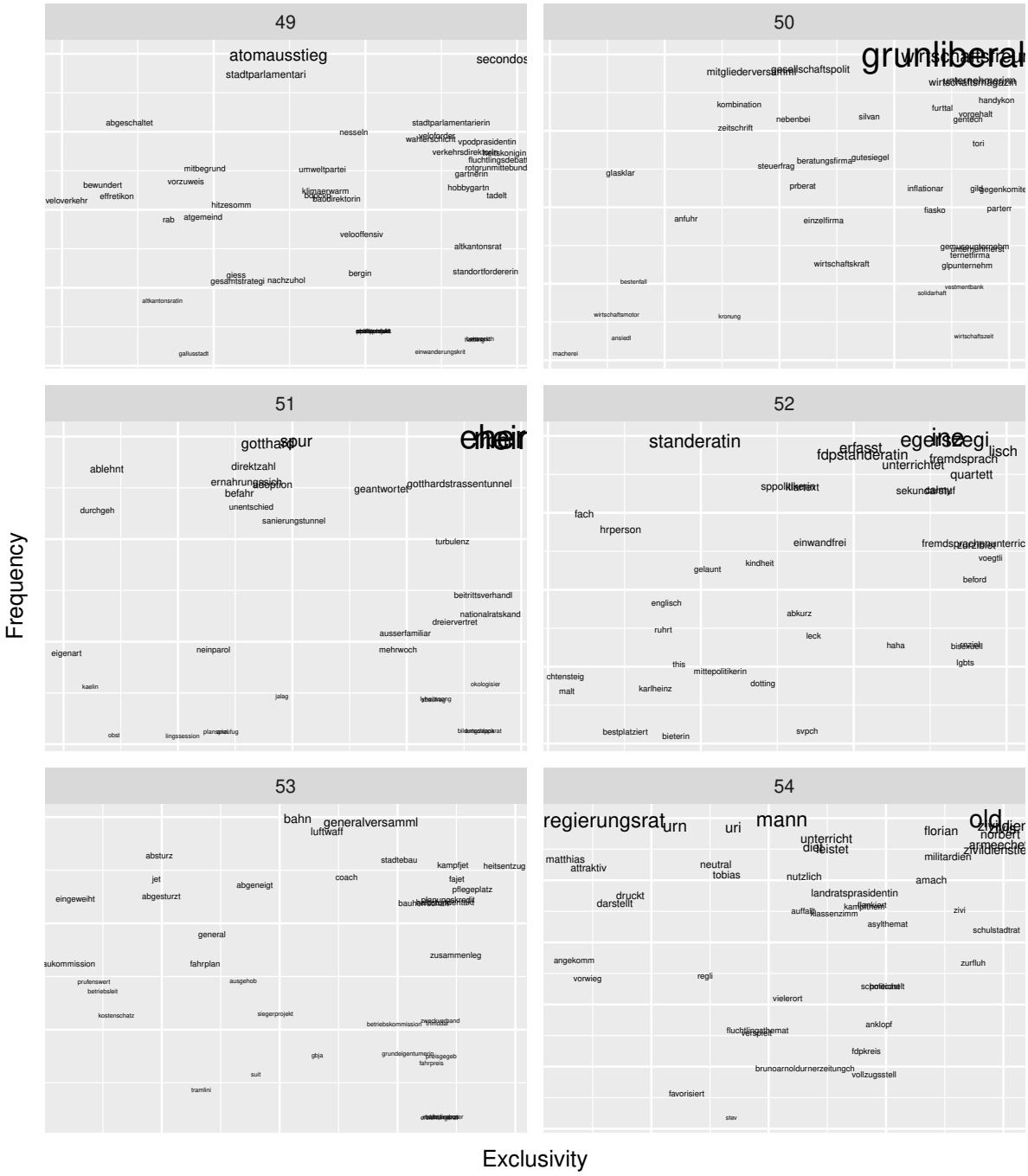


Figure A8: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*



Frequency

Exclusivity

Figure A9: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

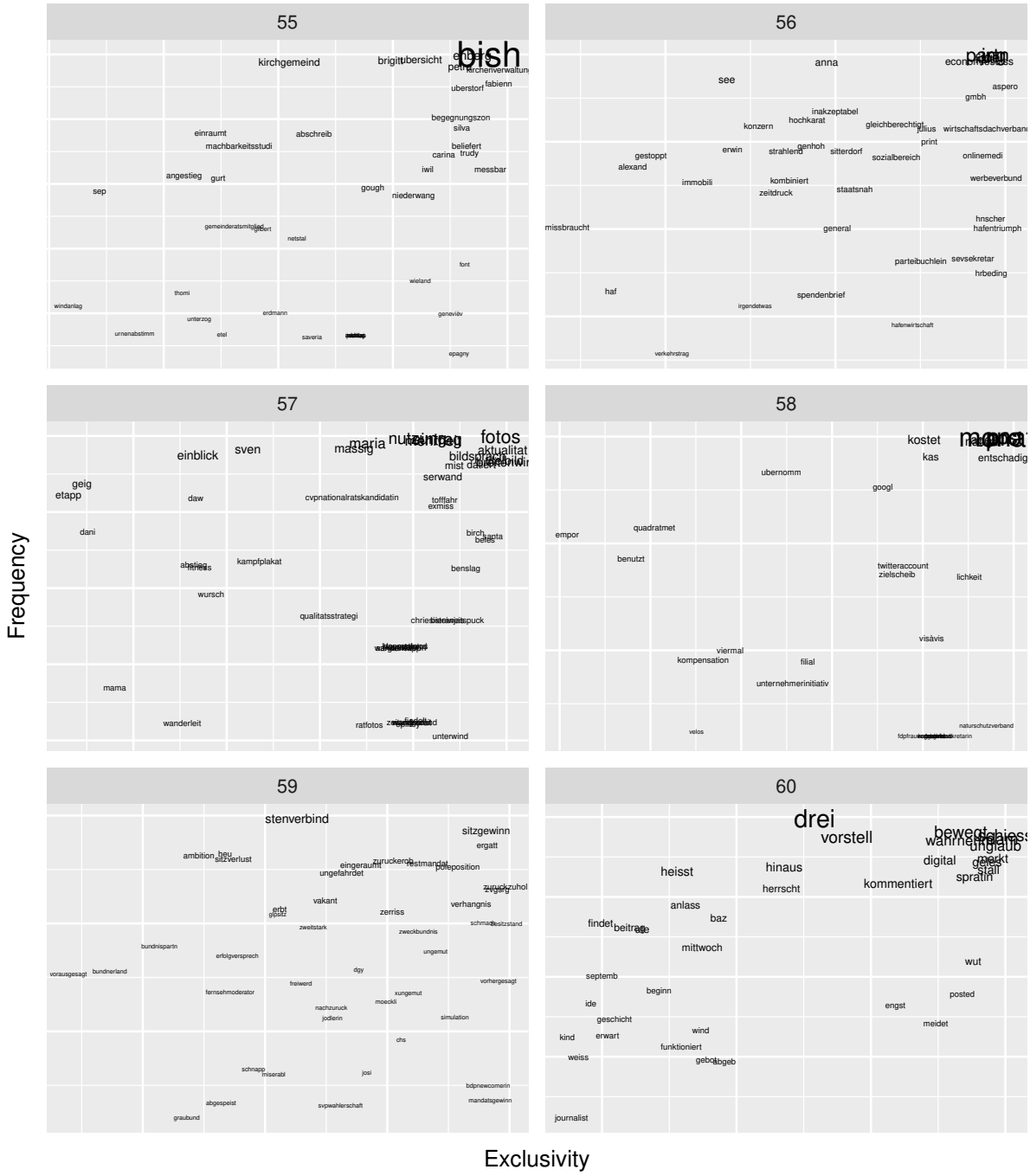


Figure A10: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

Figure A11: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

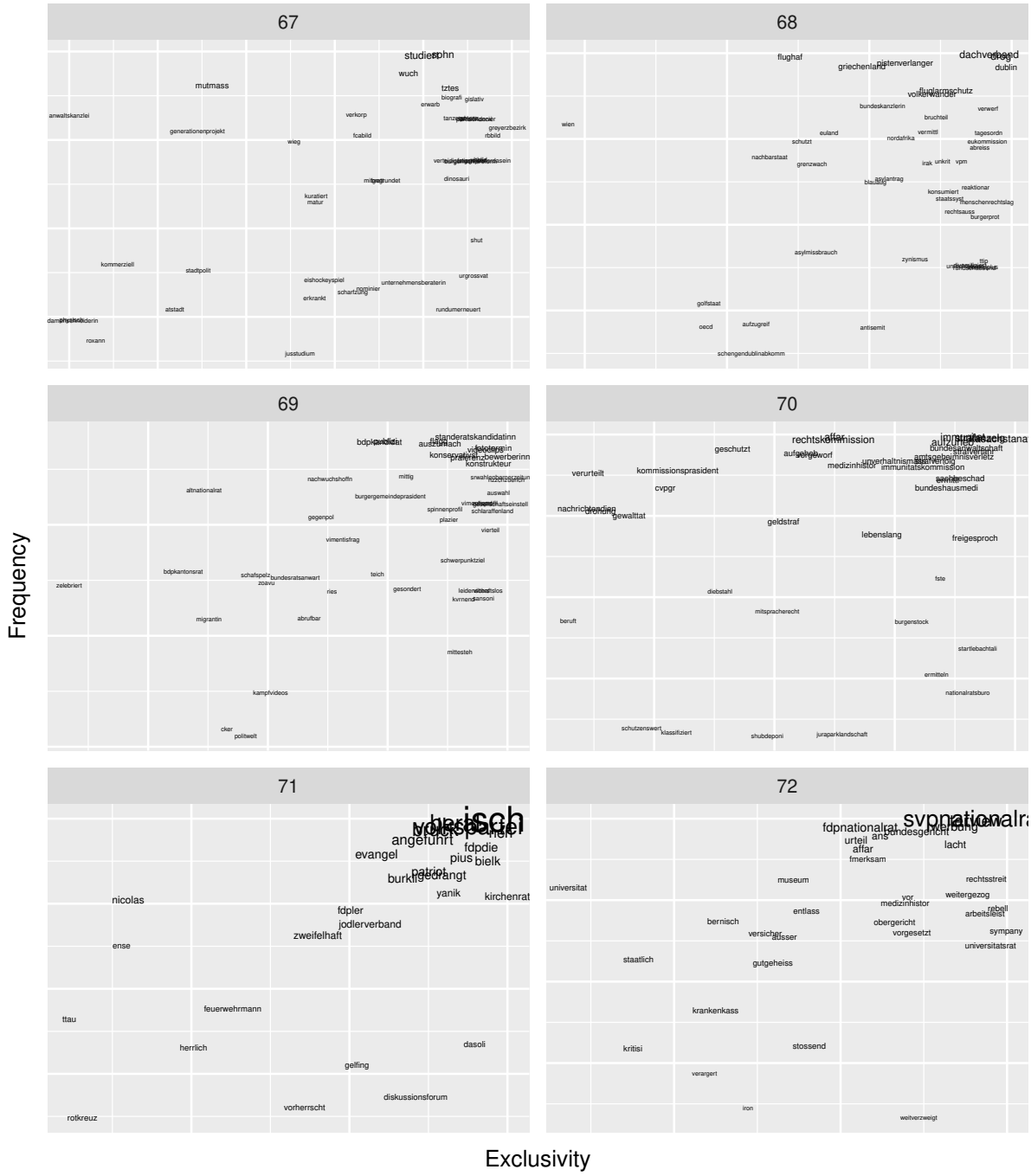


Figure A12: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

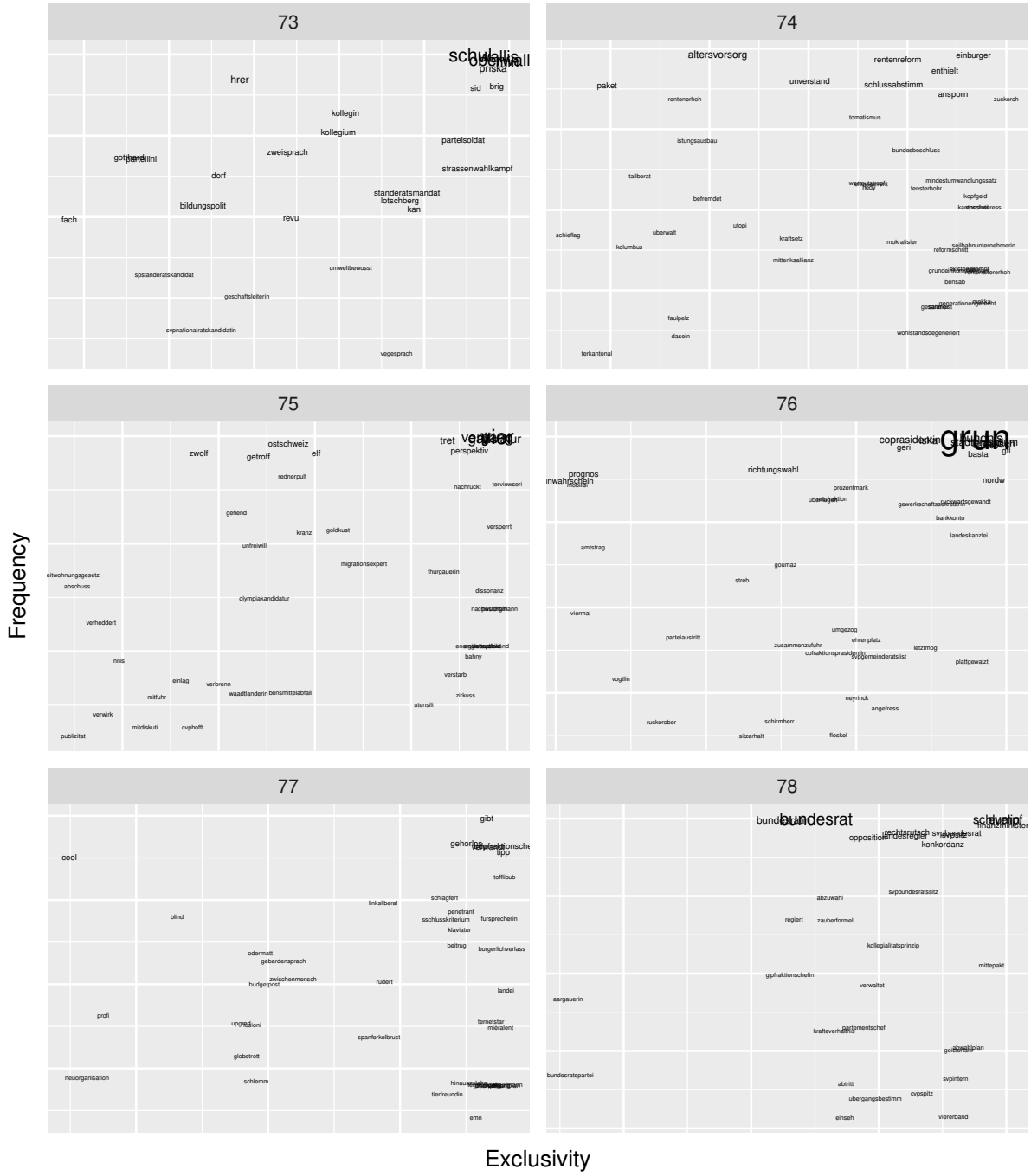


Figure A13: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

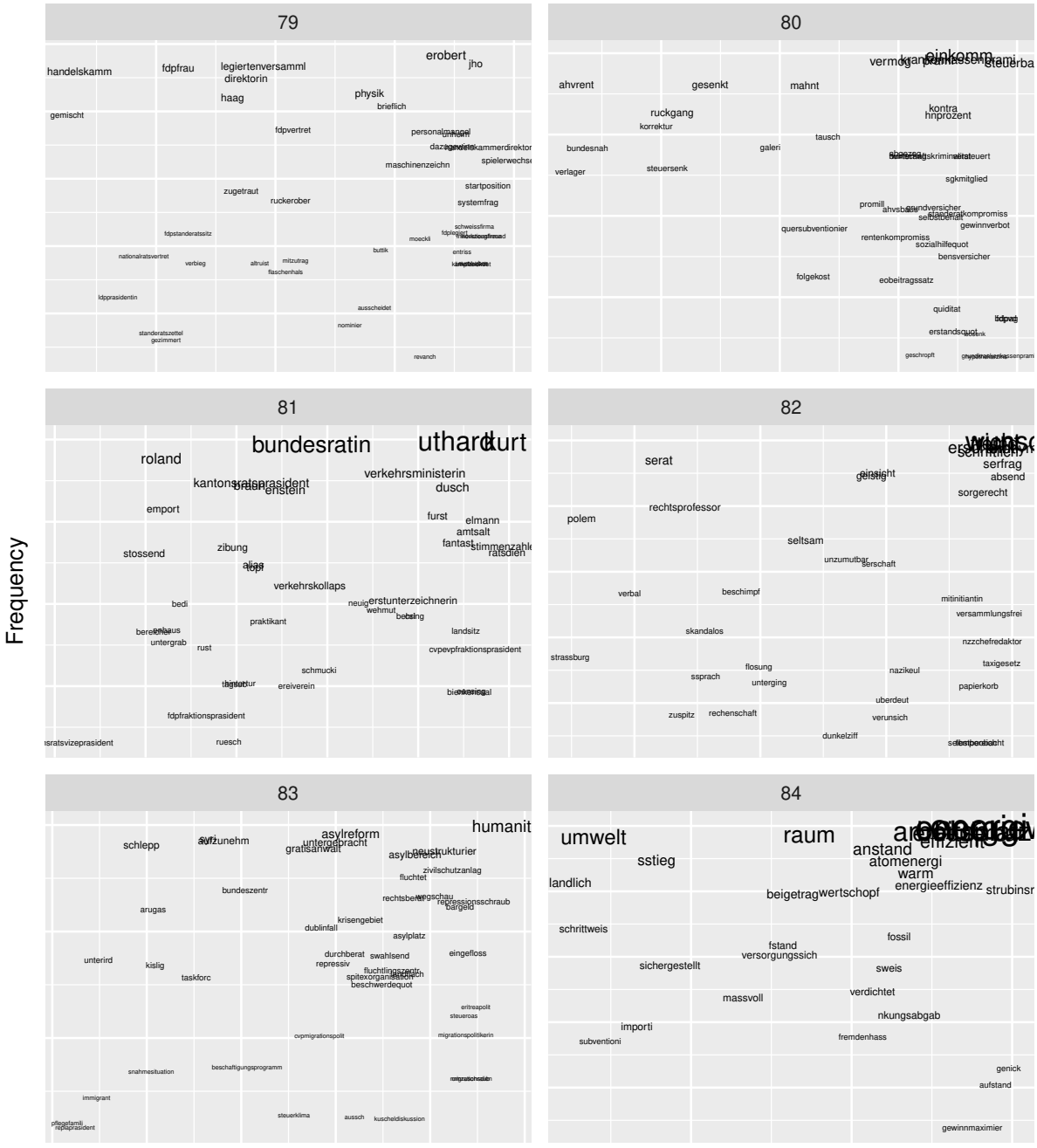


Figure A14: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

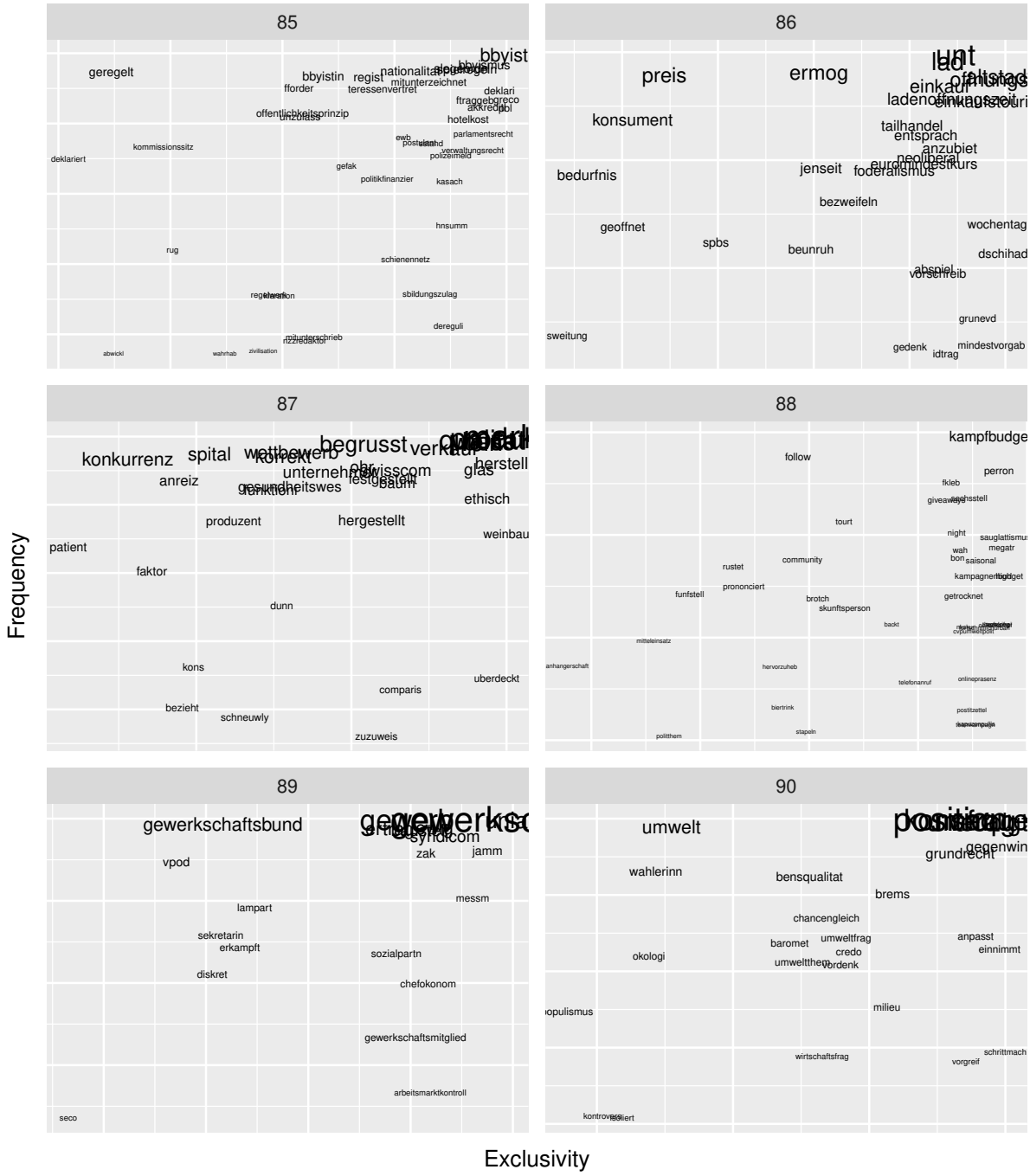


Figure A15: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

Figure A16: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*

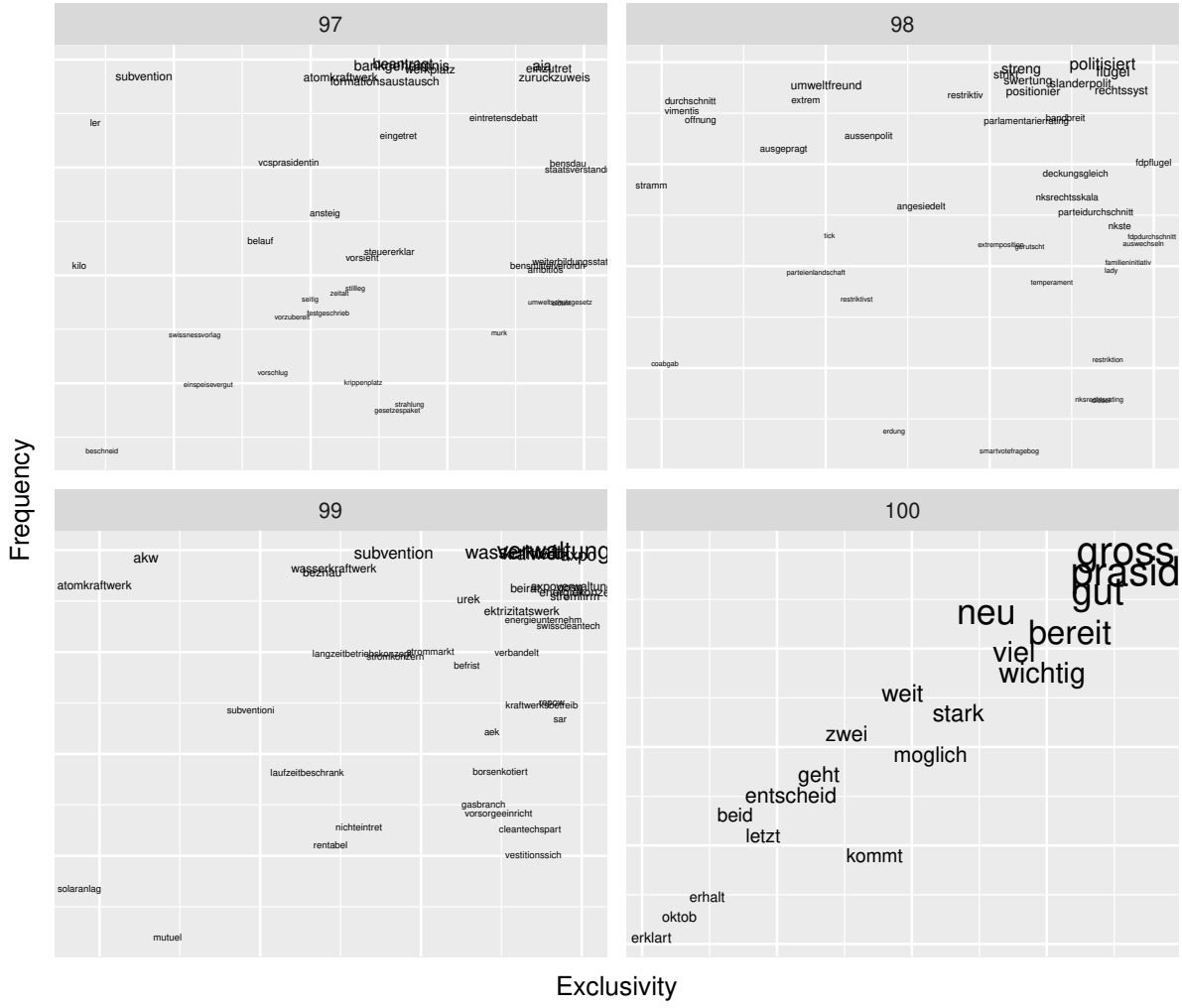


Figure A17: *Top words for the 100-topics model. Red topics are potentially connected with gender stereotypes.*